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**GROUP 2800**

**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 09/778,291

Filing Date: February 06, 2001

Appellant(s): APFEL, RUSSELL J.

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Jaison C. John  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 12/12/2005 appealing from the Office action mailed 6/28/2005.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

6,507,606	SHENOI et al.	1-2003
6,870,888	SHAPIRO et al.	3-2005

### **(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

#### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
2. Claims 1-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shenoi et al. (USPN 6,507,606) in view of Shapiro et al. (USPN 6,870,888).
3. Regarding claims 1, 12, and 24, Shenoi discloses a method of and apparatus for improving at least one gain bandwidth path, the method comprising the steps of and the apparatus comprising means for: monitoring at least one signal being transmitted (see Fig. 4, HPF unit for “monitoring” the downstream signal and LFP for “monitoring” the upstream signal at col. 8, lines 3-24); and performing a gain/bandwidth control process upon said monitoring of said signal (see Fig. 4, amp units for performing a gain control process upon the downstream signal and the upstream signal at col. 8, lines 3-24).

Shenoi does not expressly disclose that performing said gain/bandwidth control process comprises controlling a gain of a portion of said signal based upon determining a bandwidth requirement of a signal path associated with said portion of said signal. Rather, Shenoi discloses isolating the upstream and downstream signals and performing a gain control process on each, as outlined above. In addition, Shenoi teaches breaking each upstream and downstream signal into channels for transmission and assigning a gain to that channel (however, the gain is not based on

the bandwidth of the channel) (col. 12, lines 14-22). Shapiro teaches, in an ADSL system (col. 5, lines 61-62 and col. 6, lines 13-16), assigning a gain (ref. 76: G1, G2, etc.) for a portion of a signal (portion of upstream or downstream signal transmitted in a particular channel) based upon determining the bandwidth requirement (max number of bits transmitted over a channel) of that channel (col. 7, lines 36-55 and col. 8, lines 16-34), where a channel is considered to be a signal path. Here, the gain of a portion of the signal (data transmitted in a channel) will depend upon the bandwidth requirement of the signal path (max number of bits a channel can carry). Shapiro assigns each channel a particular gain in order to maximize the amount of information that can be loaded into the channel (col. 6, lines 31-62). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to perform the gain/bandwidth control process by controlling a gain of a portion of the signal based upon determining a bandwidth requirement of a signal path associated with the portion of said signal in order to maximize the amount of information that can be loaded into the channel.

4. Regarding claim 2, Shenoi in view of Shapiro discloses that monitoring at least one signal being transmitted further comprises determining whether said signal is a data signal (Shenoi: see downstream and upstream signals which carry data at col. 2, lines 13-25 and col. 8, lines 3-24).

5. Regarding claim 3, Shenoi in view of Shapiro does not expressly disclose that monitoring at least one signal being transmitted further comprises determining whether said signal is a voice signal. However, Shenoi in view of Shapiro does disclose that monitoring at least one signal being transmitted further comprises determining whether said signal is a data signal in order to amplify the signal according to frequency band and cable length (Shenoi: col. 2, lines 13-25 and

col. 8, lines 3-24). Shenoi in view of Shapiro also discloses that the voice band is susceptible to attenuation due to cable length and cable characteristics (Shenoi: col. 2, lines 35-50). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to determine whether said signal is a voice signal in order to compensate for loss due to the cable in the voice band.

6. Regarding claim 4, Shenoi in view of Shapiro does not expressly disclose that monitoring at least one signal being transmitted further comprises determining whether said signal is a DC signal. However, Shenoi in view of Shapiro does disclose that monitoring at least one signal being transmitted further comprises determining whether said signal is a data signal in order to amplify the signal according to frequency band and cable length (Shenoi: col. 2, lines 13-25 and col. 8, lines 3-24). Shenoi in view of Shapiro also discloses that the voice band is susceptible to attenuation due to cable length and cable characteristics (Shenoi: col. 2, lines 35-50). Examiner takes official notice that the voice band comprises a DC signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to determine whether said signal is a DC signal in order to compensate for loss due to the cable in the voice band.

7. Regarding claim 5, Shenoi in view of Shapiro does not expressly disclose that monitoring at least one signal being transmitted further comprises determining whether said signal is a ringing signal. However, Shenoi in view of Shapiro does disclose that monitoring at least one signal being transmitted further comprises determining whether said signal is a data signal in order to amplify the signal according to frequency band and cable length (Shenoi: col. 2, lines 13-25 and col. 8, lines 3-24). Shenoi in view of Shapiro also discloses that the voice band is susceptible to attenuation due to cable length and cable characteristics (Shenoi: col. 2, lines 35-

50). Examiner takes official notice that the voice band comprises a ringing signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to determine whether said signal is a ringing signal in order to compensate for loss due to the cable in the voice band.

8. Regarding claims 6 and 25, Shenoi in view of Shapiro discloses that performing a gain/bandwidth control process further comprises: determining an approximate length of at least one signal path carrying said signal (Shenoi: col. 8, lines 3-24); determining a bandwidth requirement of said signal path (channel) (Shenoi: col. 8, lines 3-24 and Shapiro: col. 7, lines 36-55 and col. 8, lines 16-34); determining a gain factor to be applied upon said signal path (channel) (Shenoi: col. 8, lines 3-24 and Shapiro: col. 7, lines 36-55 and col. 8, lines 16-34); separating said signal path in response to at least one of said approximate length of said signal path, said bandwidth requirement of said signal path, and said gain factor to be applied upon said signal path (Shenoi: col. 8, lines 3-24 and Shapiro: col. 6, lines 31-62 and col. 7, lines 36-55); and applying an appropriate gain within said bandwidth upon said separated signal path (Shenoi: col. 8, lines 3-24 and Shapiro: col. 6, lines 31-62 and col. 8, lines 16-34).

9. Regarding claim 7, Shenoi in view of Shapiro discloses summing said signal path in response to applying said gain upon said signal path to at least one other signal path (Shenoi: Fig. 5 and col. 7, line 64-col. 8, line 24) where the 2w-to-4w conversions implies a summation.

10. Regarding claim 8-11, incorporating arguments from claims 3-5, Shenoi in view of Shapiro does not expressly disclose that applying an appropriate gain within said bandwidth upon said separated signal path further comprises one of: applying a gain of 10 in a bandwidth of 500 KiloHertz to 5 MegaHertz in response to a determination that said signal path is a data signal

path; applying a gain of 3 in a bandwidth of 200 Hertz to 20 KiloHertz in response to a determination that said signal path is a voice signal path; applying a gain of 140 in a bandwidth of 100 Hertz to 200 Hertz in response to a determination that said signal path is a DC signal path; or applying a gain of 140 in a bandwidth of 100 Hertz to 200 Hertz in response to a determination that said signal path is a ringing signal path. However, Shenoi in view of Shapiro does disclose that the frequency range used in DSL is vendor specific (Shenoi: col. 7, lines 1-24) and that the gain will depend on the distance traveled and frequency characteristics of the cable (Shenoi: col. 8, lines 3-24). It is generally considered to be within the ordinary skill in the art to adjust, vary, select, or optimize the numerical parameters or values of any system absent a showing of criticality in a particular recited value. The burden of showing criticality is on applicant. In re Mason, 87 F.2d 370, 32 USPQ 242 (CCPA 1937); Marconi Wireless Telegraph Co. v. U.S., 320 U.S. 1, 57 USPQ 471 (1943); In re Schneider, 148 F.2d 108, 65 USPQ 129 (CCPA 1945); In re Aller, 220 F.2d 454, 105 USPQ 233 (CCPA 1055); In re Saether, 492 F.2d 849, 181 USPQ 36 (CCPA 1974); In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977); In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Since Shenoi in view of Shapiro discloses applying a gain in a particular bandwidth, it would have been obvious to one of ordinary skill in the art to apply any size of gain to any frequency bandwidth absent a showing of criticality by Applicant.

11. Regarding claim 13, Shenoi in view of Shapiro discloses that said first circuit portion further comprises at least one differential signal driver is capable of driving at least one of a voice signal, a data signal, a DC signal, and a ringing signal onto said subscriber line (Shenoi: col. 2, lines 13-25) where “capable of” and “at least one of” are broad phrases.

12. Regarding claim 14, Shenoi in view of Shapiro discloses that said subscriber line is a medium capable of transmitting signals (Shenoi: col. 2, lines 13-25 and col. 8, lines 3-24).

13. Regarding claim 15, Shenoi in view of Shapiro discloses that said subscriber line is comprised of a subscriber loop (Shenoi: col. 2, lines 13-25 and col. 8, lines 3-24).

14. Regarding claim 16, Shenoi in view of Shapiro discloses that said second circuit portion is a gain/bandwidth controller (Shenoi: col. 8, lines 3-24).

15. Regarding claim 17, Shenoi in view of Shapiro discloses that said gain/bandwidth controller further comprises: a signal path separator capable of separating a signal path based upon at least one of said bandwidth requirement, signal accuracy requirement, and a signal path characteristic (Shenoi: col. 8, lines 3-24 and Shapiro: col. 6, lines 31-62) where “capable of” is a broad phrase; a plurality of gain/bandwidth circuits coupled with said signal path separator, said gain/bandwidth circuit being capable of applying an appropriate gain based upon said separation of said signal paths (Shenoi: col. 8, lines 3-24 and Shapiro: col. 6, lines 31-62); and a summer coupled with said plurality of gain/bandwidth circuits, said summer being capable of summing a plurality of signals from said plurality of gain/bandwidth circuits and producing an output signal (Shenoi: Fig. 5 and col. 7, line 64-col. 8, line 24) where the 2w-to-4w conversions implies a summation.

16. Regarding claim 18, incorporating the rejection of claims 1, 12, and 24, Shenoi in view of Shapiro discloses a system for supporting voice band and data band communications, comprising: a sum block capable of receiving at least one of a voice signal, a DC signal, a ringing signal, and a data signal (Shenoi: col. 2, lines 13-25) where “at least one” only requires one of the signals; at least one differential signal driver coupled to said sum block, wherein said

differential signal drivers are capable of driving at least one of said voice signal, a DC signal, a ringing signal, and said data signal onto a subscriber line (Shenoi: col. 2, lines 13-25); and a gain/bandwidth controller coupled with said sum block and said differential signal driver, wherein said gain/bandwidth controller is capable of separating at least one signal path and applying an appropriate gain upon a signal on said subscriber line (Shenoi: col. 8, lines 3-24).

17. Regarding claim 19, Shenoi in view of Shapiro discloses that said sum block is capable of receiving at least one of a: DC ring signal; a metering signal; a voice signal; and a data signal (Shenoi: col. 2, lines 13-25).

18. Regarding claim 20, Shenoi in view of Shapiro discloses that said sum block is capable of summing two or more of said DC ring signal, said metering signal, said voice signal, and said data signal (Shenoi: col. 2, lines 13-25).

19. Regarding claim 21, Shenoi in view of Shapiro discloses that said subscriber line is a medium capable of transmitting signals (Shenoi :col. 2, lines 13-25).

20. Regarding claim 22, Shenoi in view of Shapiro discloses that said subscriber line is comprised of a subscriber loop (Shenoi: col. 2, lines 13-25 and col. 8, lines 3-24).

21. Regarding claim 23, Shenoi in view of Shapiro discloses that said gain/bandwidth controller further comprises: a signal path separator capable of separating a signal path based upon at least one of said bandwidth requirement, signal accuracy requirement, and a signal path characteristic (Shenoi: col. 8, lines 3-24 and Shapiro: col. 6, lines 31-62); a plurality of gain/bandwidth circuits coupled with said signal path separator, said gain/bandwidth circuit being capable of applying an appropriate gain based upon said separation of said signal paths (Shenoi: col. 8, lines 3-24 and Shapiro: col. 6, lines 31-62); and a summer coupled with said

plurality of gain/bandwidth circuits, said summer being capable of summing a plurality of signals from said plurality of gain/bandwidth circuits and producing an output signal (Shenoi: Fig. 5 and col. 7, line 64-col. 8, line 24) where the 2w-to-4w conversions implies a summation.

#### **(10) Response to Argument**

After a brief explanation of the cited prior art and the relevant case law, Appellant first asserts that “*Shenoi* simply does not disclose gain adjustment of a portion of a signal based on a determination of a bandwidth requirement for a signal path.” Appeal Brief: pg. 13. Examiner agrees. Examiner indicated as much by explicitly stating in the rejection of claims 1, 12, and 24 that “*Shenoi* does not expressly disclose that performing said gain/bandwidth control process comprises controlling a gain of a portion of said signal based upon determining a bandwidth requirement of a signal path associated with said portion of said signal.” However, as outlined below and in the Final Rejection, Examiner asserts that Shapiro makes up for this deficiency in *Shenoi*.

On page 14 of the Appeal Brief, Appellant alleges that “*Shapiro* simply does not disclose or make obvious controlling the gain of a portion of the signal based upon the bandwidth requirement of a signal path as called for by claims of the present invention.” Examiner, respectfully, disagrees. *Shapiro* teaches allocating different channels in the upstream and downstream directions by defining for each channel a bandwidth (maximum bit allocation) and a gain (G1, G2, etc.) (col. 7, lines 36-55 and col. 8, lines 16-34). *Shapiro* further discloses splitting a signal (either upstream or downstream) into portions and then allocating the portions to the channels (where a channel is equated to the “signal path”) (col. 8, lines 16-34), such that each portion of the signal will be transmitted in a channel using the gain of that channel. For example, using Fig. 2 of *Shapiro*, if a bandwidth requirement of a signal path (channel 1) is 5 bits, then the system will send a portion of the signal over that signal path, and, when doing so, control the gain of the portion of the signal to be G1 (col. 7, lines 36-55 and col. 8, lines 16-34). Thus, *Shapiro* teaches controlling the gain (gain determined by a respective channel) of a portion of the signal (portion of signal allocated to a specific channel) based upon the bandwidth requirement (max bit allocation of a channel) of a signal path (channel).”

On page 14 of the Appeal Brief, Appellant asserts that Shenoi does not disclose “monitoring a signal and performing a gain/bandwidth control process based upon monitoring the signal.” Examiner, respectfully, disagrees. “Monitoring” is a very broad term. Webster’s Collegiate Dictionary defines “monitor” as “to watch, keep track of.” Examiner asserts that the filtering performed by Shenoi reads on the “monitoring” limitation since during filtering the system “keeps track of” the signal (Shenoi: col. 8, lines 3-8). In addition, Shenoi teaches performing a gain control process based upon the monitoring since Shenoi amplifies the filtered signal (Shenoi: col. 8, lines 3-8). As such, Examiner maintains that Shenoi discloses “monitoring a signal and performing a gain/bandwidth control process based upon monitoring the signal.”

On pages 14-15 of the Appeal Brief, Appellant reiterates that

*Shenoi* clearly does not disclose determining a bandwidth requirement for a signal path associated with a portion of a signal for controlling a gain of the portion of the signal, as called for by claim 1 (as amended) of the present invention.

As stated previously, Examiner agrees, which is why Examiner combined Shenoi with Shapiro. Examiner maintains that it is the *combination* of Shenoi and Shapiro that discloses the gain/bandwidth control process called for by claim 1 rather than Shenoi alone.

On pages 15-17, Appellant reiterates that “*Shapiro* does not disclose or make obvious monitoring a signal and performing a gain/bandwidth control process based upon the signal, which includes determining a bandwidth requirement of a signal path.” Examiner, respectfully, disagrees. *Shapiro* teaches allocating different channels by defining for each channel a bandwidth (maximum bit allocation) and a gain (G1, G2, etc.) (col. 7, lines 36-55 and col. 8, lines 16-34). *Shapiro* further discloses splitting a signal into portions (“monitoring”) and then allocating the portions to the channels (where a channel is equated to the “signal path”) (col. 8, lines 16-34), such that each portion of the signal will be transmitted in a channel using the gain of that channel. Thus, Examiner maintains that *Shapiro* teaches monitoring a signal (splitting a signal into channels) and performing a gain/bandwidth control process based upon the signal (control the gain of a portion of the signal allocated to a specific channel) which includes determining a bandwidth requirement (max bit allocation of a channel) of a signal path (channel).”

On pages 17-18 of the Appeal Brief, regarding claim 12, Appellant asserts that “*Shenoi* does not separate any signal paths based upon the characteristics of the signal path to apply a corresponding gain upon the signal path.” Again, Examiner asserts that it is Shapiro, not *Shenoi*, which is relied upon to teach this limitation. Shapiro teaches separating signal paths (see the allocating channels step in col. 7, lines 36-55 and col. 8, lines 16-34) based upon the characteristics of the signal path (maximum number of bits that can be transmitted in the particular frequency to ensure a S/N ratio) to apply a corresponding gain (G1, G2, etc.) upon the signal path (channel) (col. 7, lines 36-55 and col. 8, lines 16-34). As such, Examiner maintains that *Shenoi* and Shapiro disclose separating signal paths based upon the characteristics of the signal path to apply a corresponding gain upon the signal path.

On page 18 of the Appeal Brief, Appellant asserts

that without improper hindsight reasoning, those skilled in the art would not have combined *Shapiro* and *Shenoi* since the requisite motivation is not found in the prior art or known to those skilled in the art at the time of the present invention.

Examiner, respectfully, disagrees. Shenoi and Shapiro concern analogous arts. Specifically, Shenoi's system is a DSL system (col. 4, line 66-col. 5, line 2) that uses different channels to carry information in the upstream and downstream bands (col. 5, lines 15-30 and col. 12, lines 14-22). In addition, Shenoi's system multiplies the upstream and downstream frequencies by different gains in order to combat the low-pass filter effects of a cable (col. 2, lines 35-42 and col. 8, lines 3-24). Shapiro's system is a DSL system (col. 5, lines 61-62) that uses different channels to carry information in the upstream and downstream bands (col. 8, lines 16-34). In addition, Shapiro's system applies a different gain to each channel in order to maximize the amount of information that can be loaded into a channel (col. 6, lines 31-62). Therefore, Examiner maintains that one of ordinary skill in the art at the time of the invention would have been motivated to combine the teachings of Shenoi and Shapiro to arrive at a DSL system that uses different channels to carry information in the upstream and downstream bands where the system both combats the low-pass filter effects of a cable and maximizes the amount of information that can be loaded onto an individual channel.

As outlined by Appellant on page 19 of the Appeal Brief:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, the prior art reference (or references when combined) must teach or suggest all of the claim limitations. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Third, there must be a reasonable expectation of success. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991); M.P.E.P. §2142. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (CCPA 1974).

In view of the foregoing, Examiner maintains that the prior art references when combined teach all of the claim limitation. Further, as outlined above, Examiner maintains that there is motivation in the references themselves to combine the references. Finally, given the similarity of the systems of the references, Examiner maintains that there is a reasonable expectation of success by the combination of the references.

For the reasons cited above, Examiner maintains that the independent claims 1, 12, and 24 and the dependent claims 2-5 and 13-16 are obvious in view of the cited prior art.

On pages 20-21 of the Appeal Brief, regarding claims 6-11, 17-23, and 25, Appellant asserts that Shenoi and Shapiro fail to disclose or suggest “separating a signal path in response to approximate length of the signal path and the bandwidth requirement.” Examiner, respectfully, disagrees. As outlined above, Shapiro discloses separating a signal path in response to a bandwidth requirement. In addition, Shenoi discloses that a cable has a “lowpass frequency response” that “limits the usable bandwidth and hence the bit rate” (col. 2, lines 35-42). In order to remedy this situation, Shenoi teaches providing a higher gain for higher frequency signals and a lower gain for lower frequency signals (col. 8, lines 3-24). As such, Shenoi and Shapiro suggest separating a signal path in response to approximate length of a signal path in order to correct for high frequency attenuation caused by the cable. Therefore, Examiner maintains that Shenoi and Shapiro suggest “separating a signal path in response to approximate length of the signal path and the bandwidth requirement.”

In addition, Appellant asserts that “those skilled in the art would not combine *Shapiro* and *Shenoi* in order to make obvious all of the elements of the claim claims [sic] 6-11, 17-23, and 25 of the present invention.” Examiner, respectfully, disagrees. For the reasons given above, Examiner maintains that one of ordinary skill in the art would have been motivated to combine *Shenoi* and *Shapiro* to arrive at a DSL system that uses different channels to carry information in the upstream and downstream bands where the system both combats the low-pass filter effects of a cable and maximizes the amount of information that can be loaded onto an individual channel.

In view of the foregoing, Examiner maintains that the combination of *Shapiro* and *Shenoi* renders obvious the limitations of claims 1-25.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner’s answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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